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EXAMINER	
LEUNG, WAI LUN	

ART UNIT	PAPER NUMBER
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/786,721	YAP, DANIEL	
	Examiner	**Art Unit**	
	DANNY W. LEUNG	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28,30-35 and 37-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *26-28 and 33-35* is/are allowed.

6)☒ Claim(s) *1-17,24,30,31 and 37-40* is/are rejected.

7)☒ Claim(s) *18-23,25 and 32* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Furthermore, the key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR International Co. v. Teleflex Inc.* note that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting *In re Kahn* 441 F.3d977,988,78 USPQ2d1329,1336(Fed.Cir.2006) stated that "[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness."

1. Claims 1, 6, 11, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Akiyama et al.** *(US006661974B1)*, in view of **Yao et al.** *(US005929430A)*.

Regarding claim 1, **Akiyama** discloses a multi-wavelength photonic oscillator *(fig 15)* comprising: (a) a plurality of lasers *(light sources 11_1-11_n, fig 15; (col 20, ln 4-7))* each emitting light at a different frequency *(λ_1-λ_n, fig 15; (col 20, ln 5))*; (b) an optical wavelength

multiplexer *(12, fig 15)* for combining the light emitted by the plurality of lasers at an output thereof as a set of optical wavelengths *(col 20, ln 7-9)* ; and (c) an optical modulator *(12b, fig 15)* arranged in a feedback loop and coupled to receive light at the output of the optical wavelength multiplexer *(as shown in fig 15)*. **Akiyama** does not disclose expressly wherein the feedback loop having a loop gain greater than unity and including: i) an optical tap for coupling at least a subset of said set of optical wavelengths to at least one optical output of said multi-wavelength photonic oscillator; ii) at least one optical channel having an associated photodetector arranged to receive light from the optical tap via the at least one optical channel; and iii) an electronic loop portion coupled to receive output from the at least one associated photodetector and to provide an input for the optical modulator. **Yao**, from the same field of endeavor, teaches a photonic oscillator comprising an optical modulator arranged in a feedback loop *(fig 1),* wherein the feedback loop having a loop gain greater than unity *(col 7, ln 51-63),* and including: i) an optical tap *(fig 1, 110)* for coupling at least a subset of said set of optical wavelengths to at least one optical output of said photonic oscillator *(fig 1, 100)*; ii) at least one optical channel having an associated photodetector arranged to receive light *(fig 1, 122)* from the optical tap via the at least one optical channel *(fig 1, 120)*; and iii) an electronic loop portion *(fig 1, 124)* coupled to receive output from the at least one associated photodetector and to provide an input for the optical modulator *(fig 1, 109)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to implement a feedback loop such as that of **Yao's** onto **Akiyama**'s system and the result of having an oscillator would have been predictable. Furthermore, it would have been obvious for a person of ordinary skill in the art at the time of invention to recognized that applying a known technique such as that of **Yao's** onto **Akiyama's**

base device/method/system upon which the claimed invention can be seen as an "improvement" would have yielded predictable results and resulted in an improvement system, since **Yao's** teaching is capable of enhancing performance of producing an oscillating signal.

Therefore, the rationale of applying a known technique (**Yao's**) to a known device/method/system (**Akiyama's**) ready for improvement to yield predictable results has been clearly articulated herein with the *Graham* inquiries and findings as presented above. In *Dann v. Johnston* 525 U.S. 219, 189 USPQ257 (1976) The Court held that "[t]he gap between the prior art and respondent's system is simply not so great as to render the system nonobvious to one reasonable skilled in the art."

As to claim 38, **Yao** further teaches wherein said electronic loop portion provides an electrical input for the optical modulator *(fig 1, 108)*.

As to claim 6, **Akiyama** further teaches wherein the optical tap is wavelength sensitive for directing light of a wavelength associated with a frequency of one of the lasers of said plurality of lasers into said feedback loop and for directing light of wavelengths associated with frequencies of other ones of the lasers of said plurality of lasers to said at least one optical output of the multi-wavelength photonic modulator *(col 20, ln 17-65)*.

As to claim 11, **Akiyama** further teaches wherein said feedback loop includes a plurality of parallel-arranged optical channels *(161, 165, fig 2B)* and wherein the optical tap is wavelength sensitive for directing light of wavelengths associated with frequencies of said plurality of lasers each into different ones of optical channels of said feedback loop *(col 10, ln 43-61)*.

Regarding claim 11, **Akiyama** further teaches, in another embodiment *(fig 70)* , wherein said feedback loop includes a plurality of parallel-arranged optical channels and wherein the

optical tap is wavelength sensitive for directing light of wavelengths associated with frequencies of said plurality of lasers each into different ones of optical channels of said feedback loop *(fig 70, parallel arranged detectors 75b & 75c detect optical signals of different channels)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to arrange a plurality of feedback loop to include a parallel-arranged optical channel onto **the combination of Akiyama and Yao**'s system discussed above. The motivation for doing so would have been to enhance flexibility for wavelength control *(col 48, ln 57-col 49, ln 23)*.

2. Claims 2, 7, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Akiyama** *(US006661974B1)*, in view of **Yao et al.** *(US005929430A), as applied to claims 1, 6, and 11 above, and further* in view of **Desurvire** *(US006556322B1)*.

Regarding claims 2, 7, and 12, **the combination of Akiyama and Yao** discloses the apparatus in accordance to claims 1, 6, and 11 as discussed above. **It** does not disclose expressly wherein the feedback loop has a plurality of optical channels with one optical channel imposing more delay than another optical channel with each associated photodetector in the plurality of optical channels having an output combined at a common electrical output for connection to said electronic loop portion.

Desurvire, from the same field of endeavor, teaches an apparatus having a plurality of optical channels *(F3, F4, F5, F6, fig 1)* with one optical channel imposing more delay than another optical channel *(delay 115, 116, 117, 118, fig 1)* with each associated photodetector *(119-122, fig 1)* in the plurality of optical channels having an output combined at a common electrical output for connection to an electronic loop *(col 5, ln 7-12)*. Therefore, it would have

been obvious for a person of ordinary skill in the art at the time of invention to implement **Akiyama 's** feedback loop with a plurality of optical channels with one optical channel imposing more delay than another optical channel with each associated photodetector in the plurality of optical channels having an output combined at a common electrical output for connection to said electronic loop portion as suggested by **Desurvire**. The motivation for doing so would have been to be able to effectively identify the channels that contains optical signals *(Desurvire, col 4, ln 23-34)*.

3. Claims 3-5, 8-10, and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Akiyama et al.** *(US006661974B1)*, in view of **Yao et al.** *(US005929430A),* in view of **Desurvire** *(US006556322B1), as applied to claims 2 and 7 above,* and further in view of **Applicant's admitted prior art**.

Regarding claims 3, 8, and 13, **the combination of Akiyama, Yao, and Desurvire** discloses the apparatus in accordance to claims 2 and 7 as discussed above. **Akiyama** further teaches wherein at least one of an optical portion of the loop and the electronic loop portion includes an amplifier to ensure the loop gain for the feedback loop *(col 17, ln 3-16)* . **The combination** does not disclose expressly wherein the loop gain for the feedback loop is ensured to exceed unity. **However applicant admitted** that it is common and well known to have at least one of an optical portion of the loop and the electronic loop portion includes an amplifier to ensure that a loop gain for the feedback loop exceeds unity *(page 2, ln 1-7 of spec)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to ensure the loop gain for the feedback loop in the combination of **Akiyama, Yao, and**

Desurvire's system to exceed unity as it is common and well known. The motivation for doing so would have been to have a stabled feedback control system.

As to claims 4, 9, and 15, **Desurvire** further teaches wherein at least one of the optical portion of the loop and the electronic loop portion includes phase shifting means *(123, fig 1)*.

As to claims 14 and 16, **Akiyama** further teaches wherein each optical channel in the optical portion of the loop has an optical amplifier *(col 17, ln 3-16)*.

As to claims 5, 10, and 17, **Desurvire** further teaches wherein the input for the optical modulator is an electronic input *(input to optical gates 127-130 are electronic inputs R1-4, fig 1; col 4, ln 58-60)*. **Akiyama** further teaches wherein the electronic loop portion includes a bandpass filter *(fig 70, "BPF" in element 75b and 75c)* . Furthermore, **Desurvire** teaches wherein the electronic loop portion includes electronics that validates the available channel, and "any other combination of type of gate producing the required logic function could be used" *(col 4, ln 54-55)*. Therefore, it would have been obvious for a person of ordinary skill in the art to use a bandpass filter, or electronic gates that are functionally equivalent to a bandpass filter, onto **the combination of Akiyama, Yao, Desurvire, and Applicant's admission**, such that a wavelength channel of a particular passband could be verified as suggested by **Desurvire and Akiyama**.

4. Claims 24, 31, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Katagiri et al.** *(US007050723B2)*, in view of **Graves et al.** *(US007079772B2), and further in view of* **Wagner et al.** *(US005450223A)*.

Regarding claims 24 and 31, **Katagiri** discloses A transmitter *(fig 2)* comprising: (a) optical modulators *(fig 2, 21)* for modulating optical local oscillator signals *(col 6, ln 64-col 7, ln*

6) ; (b) photodetectors *(fig 2, 27)* coupled to outputs of the optical modulators for converting the modulated optical local oscillator signals to electrical signals for subsequent application *(col 7, ln 16-28)* ; and (c) an apparatus for generating the optical local oscillator signals *(fig 2, 20; also show in fig 1)* comprising: (i) multi-wavelength photonic oscillator *(col 5, ln 37-47)* ; and (ii) a wavelength division demultiplexer *(fig 2, 24)* coupled to receive the optical output of the multi-wavelength photonic oscillator, said wavelength division demultiplexer separating the optical output into more than one wavelength region with the optical output at each wavelength region comprising at least an optical carrier *(fig 2, λ_1, λ_2… λ_N)* , the output at each wavelength region being suitable for determining a local oscillator frequency *(col 7, ln 7-35)*.

Katagiri does not disclose expressly wherein said multi-wavelength photonic oscillator producing an optical output comprising multiple optical carriers and multiple modulation side bands, said multiple optical carriers and multiple modulation side bands being grouped into more than one wavelength region with the optical output at each wavelength region comprising at least an optical carrier and a modulation sideband.

Graves, from the same field of endeavor, teaches a multi-wavelength photonic oscillator producing an optical output comprising multiple optical carriers and multiple modulation side bands *(fig 3b)* , said multiple optical carriers and multiple modulation side bands being grouped into more than one wavelength region with the optical output at each wavelength region comprising at least an optical carrier and a modulation sideband *(col 5, ln 53-col 6, ln 28)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to implement **Katagiri**'s multi-wavelength photonic oscillator as a multi-wavelength photonic oscillator producing an optical output comprising multiple optical carriers and multiple

modulation side bands, said multiple optical carriers and multiple modulation side bands being grouped into more than one wavelength region with the optical output at each wavelength region comprising at least an optical carrier and a modulation sideband as suggested by **Graves**. The motivation for doing so would have been to reduce cost and enhance controllability *(Graves, (col 2, ln 3-33)*.

The combination of Graves and Katagiri does not disclose expressly wherein the converting the modulated optical local oscillator signals to electrical signal for subsequent application is electrical radio frequency signals for subsequent application to antenna elements. **Wagner**, from the same field of endeavor, teaches an apparatus comprising: a) optical modulators *(fig 8, 410)* for modulating optical local oscillator signals *(col 8, ln 34-66)* ; photodetectors *(fig 8, 428)* coupled to outputs of the optical modulators for converting the modulated optical local oscillator signals to electrical radio frequency signals for subsequent application to antenna elements *(col 9, ln 3-34; also see antenna at the right side of fig 8)*. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to use the electrical signals from **the combination of Graves and Katagiri**'s system as electrical radio frequency signals for subsequent application to antenna elements as suggested by **Wagner**. The motivation for doing so would have been to be able to further process the communication for retransmission over radio wave.

As to claim 39 and 40, **Graves** further teaches wherein the modulation sidebands are frequency fixed relative to their carriers *(col 6, ln 3-6)*.

5. Claims 30 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Katagiri et al.** *(US007050723B2)*, in view of **Graves et al.** *(US007079772B2), and further in*

view of **Wagner et al.** *(US005450223A), as applied to claims 24 and 31 above,* and further in view of **Akiyama et al.** *(US006661974B1).*

Regarding claims 30 and 37, **the combination of Katagiri, Graves, and Wanger** discloses the apparatus in accordance to claims 24 and 31 as discussed above. **Katagiri** further teaches wherein the apparatus comprises a plurality of lasers each emitting light at a different frequency *(fig 2, 20)*; an optical wavelength multiplexer *(fig 2, 23)* for combining the light emitted by the plurality of lasers at an output thereof as a set of optical wavelengths. **It** does not disclose expressly wherein the apparatus comprises: an optical modulator arranged in a feedback loop and coupled to receive light at the output of the optical wavelength multiplexer, the feedback loop further including: an optical tap for coupling at least a subset of said set of optical wavelengths to at least one optical output of the multi-wavelength photonic modulator; at least one optical channel having an associated photodetector arranged to receive light from the optical tap via the at least one optical channel; and an electronic loop portion coupled to receive output from the at least one associated photodetector and to provide an input for the optical modulator. **Akiyama** , from the same field of endeavor, teaches the multi-wavelength photonic oscillator as discussed above regarding claim 1. Therefore, it would have been obvious for a person of ordinary skill in the art at the time of invention to use **Akiyama** 's multi-wavelength photonic oscillator as discussed above regarding claim 1 onto **the combination of katagiri, Graves, and Wanger**'s system as suggested by **Akiyama** . The motivation for doing so would have been to enable a feedback loop such as that of **Akiyama 's** to stabilize the oscillation frequency of the multi-wavelength photonic oscillator.

Response to Arguments

6. 112 second paragraph rejections are hereby withdrawn in view of applicant's amendment.

7. Applicant's arguments filed 4/21/2008 regarding claims 1, 6, and 11 have been fully considered but they are moot in view of new grounds of rejections.

8. Applicant's arguments filed 4/21/2008 regarding claims 24 and 31 are not persuasive. Applicant argues that Graves labels "unmodulated" signals as shown in dash lines in figure 1, and therefore concludes that Grave's system does not have signals with modulated side bands. However, figure 1 of Graves, also illustrates "modulated" signals in solid line, and in *(col 5, ln 62-col 6, ln 37),* Grave does in deed discuss about modulated optical carriers coming from certain wavelength groups passing through the switch, such modulated signal on each optical carrier having upper and lower sidebands. Therefore, it would have been obvious that, even not described in great details, Grave's method of processing un-modulated signal can also be applied to modulated signals in the same manner.

9. In response to applicant's argument that the combination of Graves to Katagiri's optical modulator may be used to produce complication and distortion related signals, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Allowable Subject Matter

10. Claims 25 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claims 18-23 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

12. Claims 26-28, and 33-35 are allowed over prior art as previously indicated.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Any inquiry concerning this communication or earlier communications from the

examiner should be directed to DANNY W. LEUNG whose telephone number is (571)272-5504. The examiner can normally be reached on 11:30am-9:00pm Mon-Thur.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DANNY W LEUNG
Examiner
Art Unit 2613

7/31/2008
/D. W. L./
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/Jason Chan/
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